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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/020,757	10/30/2001	Tyler A. Lowrey	INTO-0013-US (P13341)	8684
7590	06/01/2005		EXAMINER SCHILLINGER, LAURA M	
Timothy N. Trop TROP, PRUNER & HU, P.C. 8554 KATY FWY, STE. 100 HOUSTON, TX 77024-1805			ART UNIT 2813	PAPER NUMBER

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/020,757

Applicant(s)

LOWREY, TYLER A.

Examiner

Laura M. Schillinger

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 March 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10,31-37 and 41-50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 31-37,41-50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Double Patenting***

Claims 1-10, 31-37, 41-50 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-10, 31-37, 41-50 of copending Application No. 10/623861.

This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

### ***Claim Objections***

Claims 40 and 47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Claim Rejections - 35 USC § 112***

Claims 1-10, 31-37, 41-50 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant does not have support for a protective layer which completely covers the lower electrode as claimed- Applicant is referred to his own figures which show layer 40, the protective layer, which is partially removed to expose the underlying electrode in ALL of Applicant's figures.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-10 and 34-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Harshfield ('156).

Harshfield teaches the following claimed limitations as cited below:

1 (Previously Presented). A method comprising:

forming a lower electrode (Fig.18 (106));

covering the lower electrode with a protective layer such that said protective layer is formed directly over said lower electrode (Fig.18 (110)); and

forming a phase change material over said lower electrode (Fig.20 (118))- see Col.s 12-13, lines: 65-5; see also Col.13-14, lines: 60-25).

2 (Original). The method of claim 1 further comprising:

defining a singulated opening (Fig.19 (114));

forming a cup-shaped phase change material in said opening (Fig.20 (118)) ; and

forming a thermally insulating material in the cup-shaped phase change material (Fig. 21 (122)).

3 (Original). The method of claim 2 including defining said phase change material using a planarization process (Fig. 22 and Col.13, lines:20-40).

4 (Original). The method of claim 3 including defining said phase change material using a chemical mechanical planarization technique(Fig. 22 and Col.13, lines:20-40).

5 (Original). The method of claim 2 including defining a sidewall spacer in said singulated opening (Fig.37 (192))

6 (Original). The method of claim 5 including defining an electrode in said opening (Fig.21 (118)- annular electrode).

7 (Original). The method of claim 6 including using said sidewall spacer to define the cup-shape of said phase change material (Fig.37 (192)).

8 (Original). The method of claim 6 including forming a base layer over a substrate and forming said lower electrode over said base layer(Col.12, lines: 15-20).

9. The method of claim 1 including sequentially forming said lower electrode (106)and then said protective layer (110) (Fig.18).

Art Unit: 2813

10 (Original). The method of claim 9 including etching said lower electrode and said protective film using the same mask (Col.12, lines: 50-60).

34 (Previously Presented). The method of claim 1 including forming the protective layer of an insulator (Col.12, lines: 35-45).

35 (Previously Presented). The method of claim 34 including forming the protective layer of a material in the form of silicon nitride (Col.12, lines: 35-45).

36 (Previously Presented). The method of claim 35 including forming the silicon nitride in the form of  $\text{Si}_3\text{N}_4$  (Col.12, lines: 35-45).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harshfield as applied to claim 1 above, and further in view of Urabe ('302).

Harshfield teaches the limitations of claim 1 and teaches that both the lower electrode and protective layer can be formed by CVD, however fails expressly teach that both layers are

Art Unit: 2813

formed in the same deposition chamber as recited by claims 31 and 32. Harshfield also fails to mention any chamber deposition process with regard to without venting back to atmosphere as recited by claim 33.

Urabe ('302) teaches a CVD method for depositing both titanium nitride and silicon nitride in the same chamber (Abs., lines: 1-10 and Fig.3). Furthermore, Urabe does not teach to vent back to atmosphere.

It would have been obvious to one of ordinary skill in the art to modify Harshfield's teachings to include forming both the lower electrode (made of titanium nitride) and the protective layer (made of silicon nitride) in the same chamber as taught by Urabe in order to reduce the number of processing steps which would be required in using two chambers. Moreover, Urabe fails to teach to back vent to atmosphere and therefore the Examiner understands that Urabe's chamber deposition is conducted without venting back to atmosphere.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2813

Claims 1-10 and 34-37, 41-44, and 48-50 are rejected under 35 U.S.C. 102(b) as being anticipated by Reinberg et al ('671).

In reference to claim 1, Reinberg et al teaches a method comprising:

Forming a lower electrode (Col.8, lines: 35-50);

Covering the lower electrode with a protective layer (Col.8, lines: 25-40); and

Forming a phase change material over the lower electrode (Col.8, lines: 57-65).

In reference to claim 2, Reinberg et al teaches further comprising:

Defining a singulated opening (Col.7, lines: 40-50);

Forming a cup-shaped phase change material in the opening (Col.8, lines: 57-65);

Forming a thermally insulating material in the cup-shaped phase change material (Col.9, lines: 35-40)

In reference to claim 3, Reinberg et al teaches including defining the phase change material using a planarization process (Col.9, lines: 10-20).

In reference to claim 4, Reinberg et al teaches including defining the phase change material using a CMP technique (Col.9, lines: 10-20).

In reference to claim 5, Reinberg et al teaches including defining a spacer in the singulated opening (Col.8, lines: 20-30).



In reference to claim 6, Reinberg et al teaches including defining an electrode in the opening (Col.8, lines: 35-50).

In reference to claim 7, Reinberg et al teaches including using the sidewall spacer to define the cup shape of the phase change material (Fig.8 (52)).

In reference to claim 8, Reinberg et al teaches including forming a base layer over a substrate and forming the lower electrode over the base layer (Fig.12 (40)).

In reference to claim 9, Reinberg et al teaches including sequentially forming the lower electrode and then the protective layer (Col.8, lines: 50-57).

In reference to claim 10, Reinberg et al teaches including etching the lower electrode and protective film using the same mask (Col.9, lines: 25-40).

In reference to claim 34, Reinberg teaches including forming the protective layer of an insulator (Col.9, lines: 30-35).

In reference to claim 35, Reinberg teaches including forming the protective layer of a material in the form of silicon nitride (Col.9, lines: 30-35).

Art Unit: 2813

In reference to claim 36, Reinberg teaches including forming the silicon nitride in the form of  $\text{Si}_3\text{N}_4$  (Col.9, lines: 30-35).

In reference to claim 37, Reinberg teaches a method comprising:

Forming a protective layer over a lower electrode of a phase change memory(Col.8, lines: 57-65 and Col.9, lines: 30-35).

In reference to claim 41, Reinberg teaches including forming the protective layer of an insulator(Col.9, lines: 30-35)..

In reference to claim 42, Reinberg teaches including forming the protective layer of a material in the form of silicon nitride(Col.9, lines: 30-35)..

In reference to claim 43, Reinberg teaches including forming the silicon nitride in the form of  $\text{Si}_3\text{N}_4$ (Col.9, lines: 30-35)..

In reference to claim 44, Reinberg teaches a method comprising:

Forming an insulating protective layer over a conductive lower electrode of a phase change memory(Col.8, lines: 35-50 and Col.8, lines: 57-65 and Col.9, lines: 30-35);

Art Unit: 2813

In reference to claim 48, Reinberg teaches including forming the protective layer of an insulator (Col.9, lines: 30-35)..

In reference to claim 49, Reinberg teaches including forming the protective layer of a material in the form of silicon nitride(Col.9, lines: 30-35)..

In reference to claim 43, Reinberg teaches including forming the silicon nitride in the form of  $\text{Si}_3\text{N}_4$ (Col.9, lines: 30-35)..

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 31-32, 38-39 and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reinberg et al ('671) as applied to claims above, and further in view of Ovshinsky ('592).

In reference to claims 31 and 32, Reinberg teaches forming a lower electrode and a protective film. However, fails to explicitly teach forming both in the same deposition chamber.

Ovshinsky teaches implementing the same deposition chamber for sputtering an electrode material and then a silicon nitride film (Col.14, lines: 20-25).

Art Unit: 2813

It would have been obvious to one of ordinary skill in the art to modify Reinberg's teachings to include depositing both the electrode material and protective material in the same deposition chamber as claimed by the Applicant because Reinberg teaches to form such layers by PVD (Col.8, lines: 40-45) and Ovshinsky teaches his chamber may be implemented in PVD deposition processes (Col.12, lines: 25-30).

***Allowable Subject Matter***

Claims 40 and 47 contain allowable subject matter.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

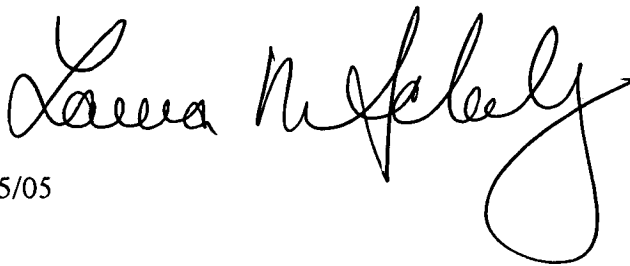
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Art Unit: 2813

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M. Schillinger whose telephone number is (571) 272-1697. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Laura M. Schillinger', with a large, stylized loop at the end.

Laura M Schillinger  
Primary Examiner  
Art Unit 2813

5/25/05